Circle Theorems (including Intersecting Chord Theorem) — Shadow Paper — Mark Scheme

Pearson Edexcel International GCSE (9–1) Mathematics A — Higher Tier · Grade 6

7 questions · 24 marks total

Q1. **Objective:** Use the intersecting chord theorem to find the length of an unknown part of a chord. **[2 marks]**

Source: Original question in the style of Edexcel 4MB1 (shadow of Q1, different values)

Worked solution

(original practice question — not an official Edexcel mark scheme)

AP × PC = BP × PD	**M1**	for use of the intersecting chord theorem
8 × PC = 12 × 6, so PC = 9	**A1**	cao

Total 2 marks

Q2. **Objective:** Combine the tangent-radius perpendicular property with angle facts around a point and in a triangle to find an unknown angle. **[3 marks]**

Source: Original question in the style of Edexcel 4MA1 (shadow of Q2, different values)

Worked solution

(original practice question — not an official Edexcel mark scheme)

Angle OBC = 90°, so angle BOC = 180 − 90 − 36 = 54°	**M1**	for a method to find angle BOC (or EOD)
Angle DOE = 180 − 54 = 126°		
Angle DFE = 126 ÷ 2 = 63°	**M1**	for a complete method to find angle DFE
63°	**A1**	cao

Total 3 marks

Q3. **Objective:** Use the angle-at-the-centre theorem and the alternate segment theorem to find two unknown angles, giving a reason for each answer. **[4 marks]**

Source: Original question in the style of Edexcel 4MA1 (shadow of Q3, different values)

Worked solution

(original practice question — not an official Edexcel mark scheme)

(a)(i)		
Angle NOM = 2 × 38 = 76°	**B1**	cao
(a)(ii)		
The angle at the centre is twice the angle at the circumference	**B1**	dep on B1 in (a)(i)
(b)(i)		
Angle NMQ = 38°	**B1**	cao
(b)(ii)		
Alternate segment theorem	**B1**	dep on B1 in (b)(i)

Total 4 marks

Q4. **Objective:** Use the alternate segment theorem (or the tangent-radius property) and an isosceles triangle to find an angle in a circle. **[2 marks]**

Source: Original question in the style of Edexcel 4MA1 (shadow of Q4, different values)

Worked solution

(original practice question — not an official Edexcel mark scheme)

Angle BAC = angle BCN = 71° (alternate segment theorem)		
Angle BCA = 71° (AB = CB, so the triangle is isosceles)		
180 − 71 − 71	**M1**	for a complete correct method to find angle ABC
38°	**A1**	cao

Total 2 marks

Q5. **Objective:** Use the tangent-radius perpendicular property together with angles at a point and angle facts in a triangle to find an unknown angle, giving a reason for each stage of the working. **[4 marks]**

Source: Original question in the style of Edexcel 4MA1 (shadow of Q5, different values)

Worked solution

(original practice question — not an official Edexcel mark scheme)

Angle ORQ = 90 − 55 = 35° (tangent meets radius at 90°)	**M1**	for a correct angle, clearly labelled
Angle OQR = 35°, so angle QOR = 180 − 2 × 35 = 110°		
Angle POR = 360 − 250 = 110°, so angle POQ = 360 − 110 − 110 = 140°		
Angle OPQ = (180 − 140) ÷ 2 = 20°	**M1**	for a complete method to find angle OPQ
20°	**A1**	cao
Angle between tangent and radius is 90°;	**B1**	dep on M1: for at least one correct reason
base angles of an isosceles triangle are equal;		
angles at a point sum to 360°; angles in a triangle sum to 180°		

Total 4 marks

Q6. **Objective:** Use the tangent-radius perpendicular property together with angle facts in a triangle to find an unknown angle, giving a reason for each stage of the working. **[4 marks]**

Source: Original question in the style of Edexcel 4MB1 (shadow of Q6, different values)

Worked solution

(original practice question — not an official Edexcel mark scheme)

Angle ORT = 24° (OR = OT, radii)	**M1**	for finding angle ORT or angle TOS
Angle TOS = 24 + 24 = 48°		
Angle OTS = 90° (tangent meets radius at 90°)		
x = 180 − 90 − 48	**M1**	for a complete method to find x
42	**A1**	cao
Base angles of an isosceles triangle are equal;	**B1**	dep on M1: for two correct reasons
angle between tangent and radius is 90°;		
angles in a triangle sum to 180°		

Total 4 marks

Q7. **Objective:** Use circle theorems — opposite angles of a cyclic quadrilateral and the alternate segment theorem — to find and give a reason for an angle, then combine further angle facts to find a second unknown angle. **[5 marks]**

Source: Original question in the style of Edexcel 4MA1 (shadow of Q7, different values)

Worked solution

(original practice question — not an official Edexcel mark scheme)

(a)(i)		
Angle DCB = 180 − 50 = 130°	**B1**	cao
(a)(ii)		
Opposite angles of a cyclic quadrilateral add to 180°	**B1**	dep on B1 in (a)(i)
(b)		
Angle ADB = 72° (alternate segment theorem)	**M1**	for a correct angle, clearly labelled
Angle DOB = 2 × 50 = 100°		
Angle ODB = (180 − 100) ÷ 2 = 40°	**M1**	for a second correct angle
Angle ADO = 72 − 40 = 32°	**A1**	cao

Total 5 marks